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THE JOHNS HOPKINS UNIVERSITY

Editor—HENRY E. SIGERIST

VOLUME III NOVEMBER, 1935 NUMBER 9

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OLD HOPKINS PICTURES No. 9

By courtesy of the Enoch Pratt Library, Baltimore.

THE MARYLAND HOSPITAL (1848)

Founded by Act of the General Assembly in 1797, this was originally a refuge for yellow fever sufferers. It was later leased to Drs. Smyth and McKenzie as a private hospital for the insane. The site was purchased in 1872 by Johns Hopkins, then planning his great hospital, and the old building was torn down. The view is looking southwest across Joppa Road, now Monument Street. At the left may be seen the old Washington College Hospital, today the Church Home and Infirmary. From: *Views of American Cities*, by August Kollner, lithographed by DeRoy, published by Goupil, Vibert & Co., New York and Paris, 1852.

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DOMENICO COTUGNO: HIS DESCRIPTION OF THE CEREBROSPINAL FLUID, WITH A TRANSLATION OF PART OF HIS *De Ischiade Nervosa Commentarius* (1764) AND A BIBLIOGRAPHY OF HIS IMPORTANT WORKS.*

HENRY R. VIETS, M. D.

1. *Introductory.*

Domenico Cotugno lived in the latter half of the eighteenth century in Naples. Here, isolated somewhat from the other physicians who were systematizing medicine and adding to our knowledge of the anatomy and pathology of the body, he, nevertheless, made definite contributions to many branches of medicine and was a leader in a new spirit, slowly making itself felt in both pathological anatomy and in a sound understanding of body function under the influence of disease. Except for contact with his local colleagues in Naples and a temporary visit with Morgagni, Cotugno led a restricted life. His principal creative work was done before the age of thirty-two, most of it in isolation. Not as great as his countryman, Morgagni, nor as Haller, who just preceded him, he carried on the traditions in part established by them. Of his contemporaries, he most nearly approaches John Hunter. Long neglected in medical literature outside of Italy, Cotugno's place in the history of medicine

* Read at a meeting of the Johns Hopkins Medical History Club, April 29, 1935.

has been ill-defined and set at too low a level. His investigations on the cerebrospinal fluid alone, although they were accomplished entirely incidentally to other research, should make him better known in the history of physic. It is this work which will be considered in this paper, together with a brief review of his life, his other works and the times in which he lived.

2. *Life and Times*

Domenico Felice Antonio Cotugno, son of Michele and Chiara Assalemme, people of humble circumstances, was born in Ruvo di Puglia, Italy, January 29, 1736. Ruvo, the site of the ancient Rubi, looks out from its splendid thirteen duomo on the Adriatic, for it stands just above the heel of the " boot " of Italy, an ancient landmark of the province of Apulia. Nearby on the seacoast is the town of Molfetta, where the young Domenico received his early instruction in Latin at the Jesuit school. He also studied with the brothers of the Society of Jesus at Andria, a hilltown near his home and only a short distance from the Castel del Monte, built by Frederick II (1194-1250). This splendid Gothic ruin, isolated on a hilltop, between Ruvo and Andria, forms a striking landmark for the whole country. It was here that Frederick is said to have retired when, after sailing from the neighboring seaport, Brindisi, on a crusade, he had to return to Italy, three days later, when pestilence broke out on his ships.

Thus the young Cotugno grew up in these historic settings. Although poor as a boy, nature had richly endowed him with an active brain. We must think of him as an ardent student, trained by the most scholarly of men, under surroundings which could only lead, in a boy of his type, to productive scholarship. The beautiful country where he was born, so rich in both Greek and Roman traditions, must have made a strong appeal to this thoughtful lad. The hilltowns of Ruvo and Andria, the seaports of Molfetta and Bari, with larger Brindisi not far away, the cathedral in his home town with its fine campanile and rich façade, the Castel del Monte near Andria, the neolithic circle at Molfetta and the superb Adriatic beyond,—a pleasant country in which to spend one's youth, even in

poverty! His teachers, too, must have awakened something in the boy for we find him being sent to the University of Naples at the age of seventeen, sponsored by the Duca d'Andria, the feudal lord of the Cotugno family. Perhaps it was Antonio Genovesi (1712-1769), the Italian philosopher, who suggested such an extraordinary course. Genovesi, who had taken orders at Salerno the year Cotugno was born, had later turned to law and finally to philosophy. He held the chair in the University of Naples and it is to him young Cotugno is said to have gone for counsel. Genovesi's advice to the country youth was remarkable and it undoubtedly colored the whole life of the beginning medical student: "If you have an original idea, write it down and put it among your papers; after some time read it, and perhaps a second idea will come to mind in a similar manner to the first. Add this to the original thought and later, reread them both. A third and fourth idea may be created and perhaps a complete work will be the result of the first idea." [1] This became Cotugno's method and resulted in three important books, filled with observation of nature, as well as numerous papers of lesser importance. The books came early in life, at twenty-five, at twenty-eight and at thirty-two, for Cotugno lost no time in following Genovesi's advice to "write it down."

Crossing Italy, Cotugno entered the University of Naples in 1753 as a student of medicine. It was a natural step. The University, founded in 1224 by the same Frederick II, whose castle at Andria was one of Cotugno's boyhood haunts, was strongly Jesuit in its teaching. The medical school, although not distinguished in 1753, was conducted by able teachers and carried on the splendid tradition of its forebear, the school of Salerno. The library, founded in 1734, unfortunately, was not available to students until some years later. The city, always turbulent with a revolutionary spirit, had only a few years previously shaken off its Spanish and then its Austrian rule for the reign of Don Carlos of Bourbon (1738) and his able minister Tanucci. Before his death in 1822, Cotugno was destined to see Naples under pestilence and revolution, a short lived Republican government with Nelson and his proud fleet in the

[1] Bianchi, Leonardo. Domenico Cotugno. *La Riforma Med.*, **39**: 1, 1923.

harbor, restoration with the execution of many of his scientific friends and finally, in his old age, Napoleonic rule. It was not an age to encourage scientific endeavor, although the school prospered under Don Carlos and Tanucci, and perhaps this explains why Cotugno's best efforts in advancing knowledge were completed at the age of thirty-two. After that came the inevitable public life of a prominent citizen and leading practitioner. Research was impossible.

With Genovesi's words in mind, Cotugno entered upon his preliminary studies at the University of Naples at the age of seventeen. He soon gained an excellent reputation as a hardworking student, devoted to anatomy and physiology. Because of his poverty he sought a position in the *Ospedali degli Incurabili,* the great hospital for chronic diseases; here we find him, two years later, provided with lodging and a small stipend a month in exchange for clinical supervision of the wards as a resident physician. The work was hard, the remuneration small and the food atrocious. Living on radishes and bread, working at top speed, and existing in unhygienic quarters soon brought on the inevitable hemoptysis, so common in Italy and elsewhere among young doctors too closely confined by the tentacles of a large hospital. Desperately ill, Cotugno was saved by a kindly superintendent, who had him moved to a larger, more cheerful room and provided a special luncheon and dinner directly from the hospital kitchens. The young doctor soon recovered, thanks to diet, fresh air and, probably, a dose of sunshine in the province of Puglia on the shores of the Adriatic.

Back in the hospital, Cotugno began his researches in anatomy and taught surgery to the medical students, holding his post in the hospital at the same time. Becoming interested in the petrous portion of the temporal bone and its contents, hundreds of animals—birds, rabbits, rats, dogs—as well as human cadavers were dissected. With great patience and care he distinguished the acoustic nerve, dividing it into its two divisions, one, " a soft nerve which is completely dispersed into the cochlea " and the other to the semicircular canals. In addition he described the vestibuble, the windows, the small details of the cochlea with its basal lamina and established without doubt for the first time that the semi-circular

canals carry a labyrinthian liquid, not mixed with air as was thought to be the case by Valsalva, who published his important monograph over fifty years before (1704).[2] Cotugno, moreover, in theory, held that the terminal elements of the cochlea, to which alone he attributed acoustic functions, were tuned to different pitches. A century before Helmholtz, he thus held the theory of the distribution of the sense of hearing in the basal membrane of the cochlea.[3, 5] The long and complicated story of the development of our knowledge of the anatomy and physiology of hearing cannot be entered into here. Cotugno's part in the discoveries, which was not inconsiderable, has recently been ably reviewed by Bilancioni.[4] Cotugno's book, *De Aquaeductibus Auris Humanae Internae* (Fig. 1), was first published in Latin in Naples, 1761, when the author was only twenty-five years of age. The fruit of five years of hard work in the confines of the hospital, much of it written under trying circumstances, it stands out as a striking contribution of a persevering, meticulous young physician, imbued with the spirit of self-sacrificing research. Beautifully written and clearly illustrated, *De Aquaeductibus Auris* takes a high place in medical literature.

Cotugno's next work was incidental to a severe epidemic of typhus fever which occurred in Naples in 1764. The chief account of the disease was written by Michele Sarcone [6] and published in Naples the next year. Sarcone's famous account has been frequently reissued in Italian, as well as in German (Zürich, 1770) and French (Lyon, 1805) translations. Cotugno made clinical and pathological investigations which were sent to Sarcone in the form

[2] Gradenigo, Giuseppe. Domenico Cotugno e la Teoria sulla Audizione (1736-1822). *La Riforma Med.*, **34**: 671, 1918.

[3] Mongardi, R. Da Cotugno a Helmholtz. *Arch. Italiano di Otologia*, etc. **22**: 393, 1911.

[5] Barduzzi, Domenico. Catugno, non Helmholtz fu l'ideatore della teoria sull' audizione. *Rivista di Storia Critica delle Scienze Mediche e Naturali* **10**: 143, 1919.

[4] Bilancioni, Guglielmo. Dissertazione anatomica degli acquedotti dell' orecchio interno dell' uomo. Translated by Vincenzo Mangono. Preface by Bilancioni. Roma, 1932.

[6] Sarcone, Michele. Istoria ragionata de' mali osservati in Napoli nell' intero corso dell' anno 1764. Napoli, 1765.

of letters and duly published in Sarcone's 'Istoria' and in the work of another commentator on the epidemic, Fasano.[7]

A more important work, however, issued in book form the same year (1764), was *De Ischiade Nervosa,* which forms the principal reason for our consideration of Cotugno at this time. The work, derived from sources similar to *De Aquaeductibus* will be considered in a separate section of this paper.

With the publication of two important books, Cotugno now found his place in the University secure. Two years later (1766), at the age of thirty, he succeeded Forelli in the chair of anatomy, having previously refused an offer from Padua to become professor of anatomy there. He visited the greatest of Italian pathologists, Morgagni, in 1765, at a time when Morgagni was already an old man, had been a professor for fifty years and had published his life work, *De Sedibus,* four years before (1761). The chair at Padua must have been a tempting offer for the young Cotugno, but the love for the south of Italy was strong within him and his own school in Naples would not be denied.

Returning to Naples, he soon became 'chief' of the *Incurabili* and the leading physician of the city. His practice is said to have been very large, especially among the churchmen. Soon politics, practice, the teaching of anatomy and the rectorship of the University absorbed all his time and left no opportunity for creative work. Only one more treatise of importance came from his hand, *De Sedibus Variolarum* (1769) (Fig. 9-13), a work of considerable worth as a clinical study of smallpox and the first clear depiction, pathologically, of the skin lesions.

A few other contributions by Cotugno are scattered among numerous papers. As a hygienist he initiated prophylactic measures against the diffusion of tuberculosis. He was the first to demonstrate the presence of albumin in the urine, although it was left to Bright to note its importance in renal disease. Cotugno also studied the pathology of heart diseases and discovered the nasopalatine nerve.[8] While dissecting a mouse, in 1784, he observed imperfectly animal electricity. Although he did not continue this study,

[7] *In,* Cotunnii, Dominici. Opuscula Medica. vol. 1, pp. 285-292, Neapoli, 1826.
[8] Castiglioni, A. Histoire de la Médecine. Paris, 1931.

nevertheless, he sowed the seed which germinated and bore fruit in the work of Galvani and Volta.

Many honors came to him in later life. He became chamber physician to Ferdinand IV and journeyed with him through Austria and Bavaria. In 1802 he stimulated the work which led to the opening of the Royal Library in Naples to students. Although Dean of the Faculty of Medicine, Rector of the Atheneum and Principal of the Royal Academy of Sciences, Cotugno's chief activity in his later years was in relation to public and private charities. He continued his hospital duties until the last year of his life and maintained a private dispensary in his home for the poor. To the hospital he left a large part of his fortune and a considerable library. Dying on October 6, 1822, he was buried in Naples with great pomp. Eulogies were read by Magliari and Scotti,[9] and a medal was struck in his honor in 1824 (Fig. 15-16). His medical works were partly collected in two volumes by Flauti[10] (Fig. 14) in 1826-7 and the additional works in four volumes by Ruggiero[11] in 1830-33. The principal biographical notices subsequently issued are by Desgenettes,[12] Bilancioni,[13] Bianchi,[14] Vulpes,[15] and a number of unsigned sketches.[16]

3. *The Treatise on Sciatica and the Cerebrospinal Fluid*

The book was first published in Latin, Naples, 1764. In the dedication to the governors of the Hospital for Incurables Cotugno states that the observations were made by him during the previous ten years, so we may assume that he began to see cases of sciatica

[9] Scotti, A. A. Elogio Storico del Cavalier D. Domenico Cotugno. Napoli, 1823.

[10] Flauti, Jo. *In* No. 7.

[11] Cotunnii, Dominici. *Opera Posthuma.* Ed. by Petri Ruggiero. 4 vol. Neapoli, 1830-33.

[12] Desgenettes. Notice biographique sur Cotugno. *Jour. Complémentaire du Dic. des Sci. Méd.* **23**: 128, 1825.

[13] Bilancioni, G. *In* No. 4.

[14] Bianchi, L. Domenico Cotugno. *La Riforma Med.* **39**: 1, 1923.

[15] Vulpes, Benedetto. Domenico Cotugno. Napoli, 1824.

[16] *Lancet*, 3d ed., 2: 476, 1826; also, *Gior. di Chir. Practica* **6**: V, 1828; also, *Ann. Universali di Med.*, 27: 475, 1823. For more extended references, *see*, Bilancioni, No. 4.

soon after entering the hospital at the age of eighteen. Sciatica was a common disease, filling the wards and the churches with its victims. Now a rare disease, Cotugno's time was before the days of modern therapeusis with the removal of foci of infection in teeth, tonsils, sinuses, appendix, prostate and gallbladder, and less exposure to damp due to faulty working conditions. To Cotugno sciatica became a clinical, as well as anatomical, problem. Familiar with the older literature, particularly the types described by Hippocrates, probably on the basis of tuberculosis, with its marked wasting and the arthritic sciatica, secondary to sacroiliac diseases, Cotugno differentiates from them a true nervous form in which the disease is localized in the sciatic nerve itself. He distinguished the posterior or true sciatica from disease of the anterior crural nerve. In the posterior type the symptoms are usually continual or intermittent pain with cramps, particularly at night. He describes patients leaping out of bed because the warmth increases the pain, and flying to the open air for relief. When the disease remains for a long time uncured there is a semi-paralysis of the affected parts always accompanied by great emaciation and insuperable lameness. From these observations he concludes that the disease is one of the sciatic nerve, although he has never had an opportunity to prove this by post mortem examination.

He speculates on the causes and says: "It seems to be an acrid and irritating matter, which lying on the nerve, preys on the stamina, and gives rise to the pain. Nor can it be doubted that this matter occupies the cavities of the nervous stamina, as they are full of a humour which they receive from the brain, and which cannot be acrid when the fountain is uncorrupt. Therefore it seems to pass between the nervous stamina, and to be contained in the cellular vaginae that enclose them. From whence this matter is derived, seems no easy question to be resolved." This is based upon his idea that the cerebrospinal fluid passes into the cavities of the sciatic nerve as well as into the cellular sheath around it. Cotugno argues that by this method sciatica may be instituted; also the disease may come from the small arteries which invade the cellular coat.

Cotugno then goes on with his anatomical studies to examine this part of the nervous system and describes in some detail the spinal

cord lying within the sheath of the dura mater and that within the vertebrae. Outside of the dura mater the space is filled with cellular fat and the space between the dura mater and the spinal cord " with water like that which the pericardium contains about the heart; or such as fills the hollows of the ventricles of the brain, the labyrinth of the ear, or other cavities of the body, which are impervious to the air." He points out, moreover that this water, which we now call cerebrospinal fluid, not only encloses the spinal cord but abounds in the cavities of the skull and fills all the spaces which are between the brain and the dura mater. This is particularly observable at the base of the brain. In older people, when the brain is diminished in size and is withdrawn from contact with the dura mater, the space left between them is always filled up with water.

He discusses the reasons why anatomists have not observed this before and states that it was common, at the time, to cut the head off from the neck for examination. Thus all the water collected about the brain and the spinal cord flowed out and was lost and when the skull was opened, the space was found to be empty. Cotugno noticed also that air usually entered this space and could be seen in little bubbles under the arachnoid, particularly in the sulci on the top of the brain. When he was careful to dissect this area without separating the head from the trunk, he never found these bubbles of air. In dissection he would open the skull without injuring the dura; then, in standing the body upright, when the dura was pricked, water flowed out. He also cut away the cerebrum and cerebellum and then stood the body erect and noted that the tube of the spinal cavity was also filled with water. He, moreover, cut the lower part of the tube where it embraces the cauda equina and noticed that a stream flowed out and that the water observed around the spinal canal gradually descended until the tube was empty. This, apparently, records the first lumbar puncture, although done post mortem. He noticed, moreover, that if the body was upright and the head had not been opened, a cut in the lower end of the tube would allow water to flow out and when the head was shaken, more water would flow " as if a new fountain was unlocked." He made these experiments on the bodies of twenty adults, which he repeated at different times, and drew off four and

sometimes five ounces of water. The fluid was usually clear, but sometimes a little yellow. In the body of a foetus strangulated in a difficult labor, the fluid was always red and opaque.

He argued against the point that the fluid could be accumulated after death and apparently did some experiments on living animals to confirm his point of view. The animal that he particularly speaks of is the sea tortoise, one that weighed fifteen pounds. He found the brain to be very small in proportion to the skull and that the space between it and the skull was filled with water. In the examination of dogs and fowl he found that the brain was much larger and appeared to fill up the whole cavity.

Still expressing wonder that the cerebrospinal fluid had not been seen before, Cotugno states that this fluid, as well as every other that moistens the cavities of the human body, " oozes out from the extremities of the small arteries and is again resorbed by the small inhaling veins so as to be in a continual state of renovation." He proved experimentally in his previous work on the duct of the ear that some of the small veins of the dura mater open upon its internal surface. Cotugno then settled the question of coagulation by boiling the fluid. It had long been thought, apparently, that the water from the ventricles always coagulated, but he placed a number of ounces of this fluid on the fire and it boiled away without leaving any residue. He then tested many other fluids from various types of animals in order to study their coagulation and concluded that the spinal fluid had no such properties, probably because it passed through extremely small vessels. Cotugno noted that the fluid which surrounds the spinal cord always penetrates the coverings of the nerves. It nourishes and bathes them, probably throughout the whole body. He describes the dura mater as a kind of bandage which encloses like a funnel every nerve proceeding from the spinal cord and that this funnel-shaped covering is filled with spinal fluid. This arrangement, however, only proceeds as far as the ganglion of the nerves, for from that point on the covering spreads into a cellular lamina which partly embraces the nerve on all sides and partly closes every nervous fibril. Therefore there seems to be no passage of fluid beyond the ganglion. He was able, however, to force air beyond this point as well as quicksilver,

although it was necessary to use a considerable degree of pressure. He felt that by a similar method the spinal fluid might penetrate into the sheathe of the nerve far beyond the point of the ganglion.

After this experimental work Cotugno turns to the actual application of it to sciatica. He believes that the fluid, extending the covering of the nerve, actually causes the pain, partly because the fluid becomes acrid and so stimulates and irritates the nerve. He notes that sciatica is often caused by violent blows on the hip or strains when lifting great weights. These, he believes, cause a greater quantity of blood to be attracted towards the nerves of the hip and the sciatic nerve imbibes some of the humours from the blood. Other causes he lists are rheumatism, veneral disease, ulcers of the leg, and exposure to extreme cold. These causes in some way increase or vitiate the fluid and the fluid, in turn, irritates the nerve.

The condition clinically he speaks of as dropsy of the sciatic nerve and his treatment is based upon this assumption. He also finds a similar condition in other nerves.

In summary, he states that sciatica begins as the result of the stimulus of the acrid matter, which leads to inflammation of the coverings. This is the first stage of the disease. Then comes the dropsy, which continues as true sciatica. The nerve becomes weakened and cannot longer be serviceable to the muscles, so that by defect of the nerve, a semi-paralysis of the leg comes on. This is commonly the last stage of the disorder. The three stages, therefore, are the inflammation, the dropsy and the semi-paralysis.

Cotugno then discusses the various forms of treatment in vogue, such as blood letting, in which he stresses the point at which the phlebotomy is to be performed in different stages of the disorder, thus holding, in 1764, to an old concept. He also believes that the bleeding of hemorrhoids is likely to be of benefit to the patient and points out the connection between the hemorrhoidal veins and those of the leg. In general, blood letting seems to have been a successful measure of treatment, at least in some cases.

The second method used was purging, which also was effective. He used a clyster and thought that better than violent purges. Massage was useful, if not too violent. He advocated " stroking the

part affected along the track of the pain with the naked hand, without flannel or any other stimulating substitute." Olive oil was also used. He noted that massage by riding in a carriage gave a good deal of relief and even speaks of singing as a means of massage. Opium was used as an anodyne and in the syphilitic cases mercury and guiacum were employed.

Finally the best of remedies is probably the use of caustics, which seem to draw out the acrid matter. This is emphasized by Cotugno and appears to be his chief contribution to the therapy of sciatica. He uses these caustics to form a blister, particularly applied, as shown in the diagram, over certain areas below the knee and on the dorsum and external aspect of the foot. Case histories are given, showing the advantage of this method of treatment. He advises physicians to look at the excellent anatomical plates in Eustachius, particularly the 19th and 20th plates, which show the course of the nerve. By comparing these with the plate given at the end of his book one can more clearly understand to what part of the nerve the blister is applied. He believes that the blister is better than the actual cautery. The method of treatment was very painful, but Cotugno feels that the degree of success obtained justifies the procedure. He never witnessed a recurrence of the disease once the patient had been cured by the blister. In the very old cases, where paralysis has taken place, there was always a residual deficit.

If, then, we ignore in part Cotugno's speculations regarding the cause and cure of sciatica, we still have left his clear description of the cerebrospinal fluid. He ingeniously devised experiments to demonstrate the subarachnoid space and, moreover, suggested that the fluid was in circulation, being secreted by the arteries and absorbed by the veins, points only clearly enunciated in our lifetime by Weed, Cushing and others.

Cotugno, however, was not the first anatomist to describe the cerebrospinal fluid. Bilancioni [17] has pointed out that Valsalva in 1692 mentions the fluid, although he gives no description that can in any way compare with that of Cotugno, seventy years later. Valsalva, in cutting open the spine of a dog, noticed the liquid,

[17] Bilancioni, G. Valsalva, scopritore del liquido cefalo-rachidiano. *Il Policlinico*, **18**: 1045, 1911.

" which in all its aspects resembles that which is found in the joints." On this precise description Valsalva must receive the honor of the discovery. It was Cotugno who elaborated the pathways of the cerebrospinal fluid and noted in more detail its character. Historically, Valsalva was the forerunner. Of the men who followed I need only mention Magendie, Corning, Quincke, Mestrezat, Ayer, Weed, and Cushing to indicate our progress in the investigation of the contents of the ventricles of the brain and the subarachnoid space.

Cotugno's work, *De Ischiade Nervosa Commentarius* (Fig. 2-8), has passed through many printings in its two editions. Some of them, but not all, have been gathered together as an exhibit accompanying this brief account of an eighteenth century anatomist, whose principal contribution to medicine, a description of the cerebrospinal fluid, long buried in a work on sciatica, has only recently been emphasized and given its proper position in history.

APPENDIX

A. Bibliography of the Important Works of Domenico Cotugno

1. *De Aquaeductibus Auris Humanae Internae. Anatomica Dissertatio.*

1761, Neapoli, ex typographia Simoniana. 8° — pp. 10 + 80 + 4, 2 pl.

*1768, (1760), Roterodami, *in* Sandifort's Thesaurus, vol. 1, pp. 389-450, 2 pl.

*1774, Viennae, apud Rudolphum Graeffer. 8° — pp. 20 + 188, 2 pl.

1775, Neapoli et Bononiae, ex typographia Sancti Thomae Aquinatis. 8° — pp. 116, 2 pl.

*1932, Roma, casa editrice Luigi Pozzi. 8° — pp. 168, 4 fig. (in Italian).

2. *De Ischiade Nervosa Commentarius.*

*1764, Neapoli, apud Fratres Simonios. 8° — pp. 8 + 88, 1 pl.

1768, Carpi, ex Calcographia Publici. 8° — pp. 8 + 80, 1 pl.

*1769 (1764), Roterodami, *in* Sandifort's Thesaurus, vol. 2, pp. 403-451, 1 pl.

*1770, Viennae, apud Rudolphum Gräffer. 8° — pp. 12 + 124, 1 pl.

1773, Viennae, apud Rudolphum Gräffer.

*1775, London, printed for J. Wilkie. 8° — pp. 20 + 172, 1 pl.
(A Treatise on the Nervous Sciatica, or, Nervous Hip Gout).
*1775, Neapoli, et Bononiae, ex typographia Sancti Thomae Aquinatis. 8° — pp. 102 + 2, 1 pl.
*1782, Venetiis, typis Bartholomaei Occhi. 8° — pp. 100, 1 pl.
1792, Leipzig (in German).
1860, Neapoli, stamperia Vico S. Girolamo. 8° — pp. 91 (in Italian).

2a. *De Ischiade Nervosa. Novis Curis Auctior.*

*1779, Neapoli, ex typographia Simoniana. 8° — pp. 16 + 158, 4 pl.
*1789, Neapoli, et Bononiae, ex typographia Sancti Thomae Aquinatis. 8° — pp. 122, 4 pl.

3. *De Sedibus Variolarum.*

*1769, Neapoli, apud Fratres Simonios. 8° — pp. 208, 1 pl.
*1771, Viennae, apud Rudolph Graeffer. 8° — pp. 16 + 274 + 6, 1 pl.
*1775, Neapoli, et Bononiae, ex typographia Sancti Thomae Aquinatis. 8° — pp. 172, 1 pl.
*1786, Lovanii, typis Academicis. 8° — pp. 16 + 216, 1 pl.
*1789, Neapoli, et Bononiae, ex typographia Sancti Thomae Aquinatis. 8° — pp. 158, 1 pl.

COLLECTED WORKS

Opuscula Medica.

*1826-7, Neapoli, ex Officina Bibliographica et Typographica. 2 vol. 8° — pp. 16 + 298; 4 + 366.

Opera Posthuma.

1830-33, Neapoli, typis Tramater. 4 vol. 8° — pp. 8 + 372; 364; 282; 284.

Works seen by the author are marked with an asterisk. For others he is indebted to Professor Putti, Bologna, the librarian of the Biblioteca Nazionale di Napoli and the librarian of the Welch Medical Library. Partial bibliographies occur in Desgenettes,[12] Bianchi,[14] Bilancioni,[4] Vulpes,[15] Scotti,[9] Capparoni.[18]

[18] Capparoni, Pietro. Profili Bio-Bibliografici di Medici e Naturalisti Celebri Italiani dal Sec. XV al Sec. XVIII. **4**: 97. 1932.

B. Extract from "A Treatise on the Nervous Sciatica, or Nervous Hip Gout." By Dominicus Cotunnius. London: J. Wilkie, 1775. Pp. 14-27.*

At first, therefore, it is necessary to promise, that the hollow of the spine, which, from the great *Foramen* of the *Occiput*, reaches to the extremity of the *Os sacrum*, through which the spinal marrow descends, is larger in men than in other animals; for it is so large, that it not only affords a convenient passage for the marrow, as it does in other animals; but although the marrow, in proportion to the brain, which is larger in men, is also fuller than in other animals; the capacity of the spine far exceeds the size of the marrow; so that around the marrow descending in the spine, there is a considerable space remains. This space is not entirely void of matter; for through it descends the Dura Mater, which being formed into a tube, from the great *Foramen* of the *Occiput*, incloses the spinal marrow like a sheath. This tube of the Dura Mater is not so large as to touch the surrounding enclosure of the spine on all sides, nor so narrow as to embrace the included marrow closely: but it is somewhat distant from the hollow of the spine, chiefly backwards towards the seat of the spinal *Apophyses*, and is separated from the *Ambitus* of the enclosed marrow by a considerable space. These two spaces, when a man is in health, are not empty, but each is filled with a matter peculiar to itself; for all that space, which is between the Dura Mater and the enclosures of the hollow of the spine, is always filled with a cellular kind of substance, replete with a soft and fluid kind of fat; in the room of this, in consumptive persons there is a mucid vapour, and a true mucus in dropsical persons, and in foetuses suffocated in difficult labours, a sanguineous vapor. But, also, all that space which is between the Vagina of the Dura Mater, and the spinal marrow, is always found to be filled, not as some eminent men imagine (because the fact is as yet immersed in obscurity) by the marrow itself, which is more full in living, than in dead subjects, nor by a thick vapour; but with water, like that which the Pericardium contains about the heart; or such as fills the hollows of the ventricles of the brain, the labyrinth of the ear, or other cavities of the body, which are impervious to the air.

* Presumably translated by Henry Crantz.

This water, which fills the tube of the Dura Mater even to the *Os sacrum*, does not entirely enclose the spinal marrow, but even abounds in the cavity of the skull, and fills all the spaces which are between the brain and the *ambitus* of the Dura Mater. Some of these spaces are always to be met with about the basis of the brain; and it is not uncommon to find a considerable space between the *ambitus* itself of the brain, and the surrounding Dura Mater. This is principally to be found in consumptive persons, and old men. In such the brain is found to be considerably wrinkled up, or contracted; and that which the skull, naturally, can hardly contain, is hardened by old age, or the power of the consumption, and gradually diminished in its size. But here, as much as the brain diminishes in its size, so far is it withdrawn from contact with the Dura Mater, and whatever space is left between, is all filled up with a watery vapour; therefore, in the dissection of old men, and consumptive persons, if we carefully open the *Fornix* of the skull, and stir the sound Dura Mater in any part, we shall find a watery stream immediately burst forth, and when this is exhausted, see the whole fall relaxed upon the brain, and wrinkle up. This does not only hold true, in regard to the brain, but also to the spinal marrow, which in the same subjects is smaller, and leaves a larger space between itself and the Dura Mater, which the water occupies; so that it seems we may lay it down as a certain truth, that the space which is filled with water around the spinal marrow in men, encreases by age; for this space, which is not to be found in a foetus, where the marrow is embraced by the tube of the *Dura*, especially in the neck, increases by age, and grows considerably large.

The reason that anatomists have never yet observed this collection of water about the brain, and in the spine, is owing to the common preposterous method of dissecting; for, when they are about to examine the brain, they commonly cut off the head from the neck. By this means the tube of the Dura Mater, which descends by the spine of the neck, being cut through, all the water that is collected about the brain, and the spinal marrow, flows out, and is foolishly lost; so that, when the skull is opened, all the spaces between the brain and the Dura Mater, which were before filled with water, are now found empty, and deceive the anatomist with the appearance

of empty cavities, which, perhaps, some dissipable vapour filled. Here then, nothing scarce at all is to be found, either in the cavities at the base of the skull, or in the chief vaginal sinus's of the Dura Mater, to prove that they were occupied before by some fluid. So that, by this irrational method of dissecting, all the fluid collected around the marrow and brain being lost, air enters in, and supplies its place. This is the reason, that, in examining the brain, we find a number of little bubbles of air, under the *Membrana Arachnoides*, on the top of the *Sulci* or furrows of the brain. The number, indeed, is greater, or less, in different subjects, according to the greater or less distance or partition of the *Pia*, and *Arachnoides* membrane. To these partitions there is an open passage, where the *Arachnoides*, in its descent to the spine, make its greatest recession from a contact with the Pia Mater: through this passage, on cutting off the head, as the fluid of the *Sulci* of the brain flows out, the air rushes in and occupies its room. Therefore, in those heads which I have carefully opened, without separating them from the trunk, I never found these little bubbles of air under the *Arachnoides*.

As, therefore, such a collected fluid may be plainly observed about the brain, and spinal marrow, we must carefully make the following experiments. Let the head of the undivided body be put into an erect position; the integuments being dissected, and the bones bared, proceed to separate the bony *Fornix* of the skull, by an horizontal section. But in beginning thus, great care must be taken in cutting the bone, or separating it, not to perforate the adjoining Dura Mater. If this rule is observed; when the bone is taken off, if it be the body of an old man, or consumptive person, we shall find, wherever it is pricked, that water will flow out: if not, it will appear to be exactly filled with the brain. But after this, let the Dura Mater be dissected, and the brain bared, and then it will plainly appear under the *Arachnoides*; where not the smallest bubble must make its appearance. After this, lift up gently the anterior lobes of the brain, and you will see each of the cribrose cells of the Ethmoides abounding with water: and, upon raising the rest of the brain, you will find, at the conjunction of the optic nerves, and the sides of the oval protuberance, all those parts, that in decollated bodies are found empty, full of water. This water may fill the

vaginal Sinus of the fifth pair, and the whole auditory Meatus. All that space that is around the trunk of the *Medulla oblongata* is filled with water; and if, after the trunk is cut through, the *Cerebrum* and *Cerebellum* be taken away, and the body put in an erect position, the tube of the Dura Mater will be found to be exactly full of this water all around the spinal marrow. After this, if you cut through any of the Vertebrae of the loins, and the lower part of the tube of the Dura Mater, where it embraces the *Cauda equina*, you will find a limpid stream flow out, and the water that was before observed around the spinal marrow will gradually descend, till it is all emptied by the aperture at the bottom. If you open the Vertebrae of the loins before the head is touched, and cut the enclosed tube of the Dura Mater, a great quantity of water will burst out, and after all this spontaneous flux of water is spent, if you lift up the head, and shake it towards the aperture, a more plentiful stream will burst out, as if a new fountain was unlocked. In these experiments, which I made on the bodies of near twenty adults, and which I repeated at different times, I could draw off freely from the hollow of the spine, four, and even sometimes five ounces of water: I commonly found it very clear in such subjects, although it sometimes inclined a little to a yellow colour; but in foetus's strangled in difficult labour, little as it was, I observed it to be always red, and opake.

It may not be absurd, indeed, to entertain some doubt whether this quantity of water about the brain, and the spinal marrow, is not in consequence of a man's death; and whether a man, when living, has not these spaces empty, or filled with a kind of vapour, or more turgid marrow. But I think we have not much reason to imagine there are void spaces in living, when these spaces are found full in dead subjects; for the law of nature tells us the contrary,—Nuspiam vacuum in animantium esse corpore, in quo quicquid libere exterior aër solidumve non replet, impleat humor;—and that there can be no void space in the bodies of living animals, for if a space is not occupied by some solid substance, or is impervious to the air, it must be filled with some fluid. Neither, if we suppose a vapour to occupy these spaces in living, can it seem very probable, that it should be so condensed in dead men, as to fill them entirely with

water. But besides, the dissection of some living animals confirms me in my opinion, that this water which we doubt of, is also to be found in a living man: for in those fishes which I have dissected when alive, or immediately after death (and especially in the sea-tortoise of about fifteen pounds weight), I have found the brain to be very small, in proportion to the skull, and a considerable space remaining on the inside between them; and it appeared that all this space was filled with water all around the Medulla Spinalis, which took up the other part of space remaining. But I did not find it to be the same in living dogs, or flying fowls, as the brain and spinal marrow here were so large, whether the subjects were alive or dead, that the cavity in which they were contained, was entirely filled up. But though these animals were not so proper to prove the existence of the fluid, yet they exhibit a clear proof that the brain and spinal marrow are not diminished in their size by death. Although there are some who imagine that the spinal marrow is larger in life, and that it is sufficient of itself to fill up all the surrounding space: they ought, however, to take notice, that the branches of the nerves, proceeding from the spinal marrow, which in a dead body run along that space unfolded, would, by their supposition, be entangled, and compressed in a living subject. All that space, therefore, which is around the spinal marrow, is filled with water naturally, and in this respect, a dead body varies little, or nothing from a living one.

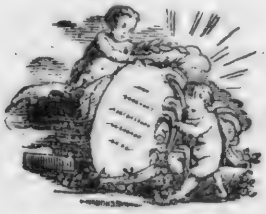
But it seems a wonder that many famous men, who have diligently examined the fluids of the cavities of the human body, should pass over in silence, or have taken no notice of this large and capital cavity of the spine, which abounds so plentifully with a fluid. It seems beyond a doubt, that this fluid of the spine, as well as every other that moistens the rest of the cavities of the human body, oozes out from the extremities of the small arteries, and is again resorbed by the small inhaling veins, so as to be in a continual state of renovation: I myself can entertain no doubt of this, as I have before proved experimentally that some of the inhaling mouths of the small veins of the *Dura Mater* opened upon the internal surface; of the truth of which *Abraham Kaavius*, the grandson of the illustrious *Boerhaave*, formerly doubted. But I have no doubt

that the great Physician *Haller's* opinion is founded on fact; that those waters, which the ventricle of the *Cerebellum* received, either from the greater ventricles of the brain, by the Lacunae, or *Sylvius's* aqueduct, or the proper exhaling arteries, were afterwards mixed with those of the spine; as here, their perpendicular position, and the free passage that is about the cavity of the spine, sufficiently prove to us that there is a defluxion of humours to the spine.

DOMINICI COTUNNII
PHILOSOPHIÆ & MEDICINÆ DOCTORIS
DE
AQUÆDUCTIBUS
AURIS
HUMANÆ INTERNÆ.

ANATOMICA

DISSERTATIO.



VIENNÆ
APUD RUDOLPHUM GRAEFFER.
1774.

FIG. 1. Title page, *De Aquaeductibus Auris*, Vienna, 1774.

DOMINICI COTVNNII

PHIL. ET MED. DOCT.

DE

ISCHIADE NERVOSA

COMMENTARIVS.

NEAPOLI

APVD FRATRES SIMONIOS

PVBLICA FACVLTATE.

FIG. 2. Title page, *De Ischiade Nervosa*, Naples, 1764. First Latin edition.

DOMINICI COTVNNII

PHIL. ET MED. DOCT.

DE

ISCHIADE NERVOSA

COMMENTARIVS.

VIENNÆ,
Apud Rudolphum Gräffer.

1770.

FIG. 3. Title page, *De Ischiade Nervosa*, Vienna, 1770. Courtesy of Prof. J. F. Fulton.

A

TREATISE

ON THE

NERVOUS SCIATICA,

OR,

Nervous Hip Gout.

BY

DOMINICUS COTUNNIUS, Phil. & Med. D.

LIBERTAS, QUÆ SERA TAMEN RESPEXIT INERTEM,
CANDIDIOR TAMEN, ET LONGO POST TEMPORE VENIT.

VIRGIL. Buc. Ec. I.

LONDON:

Printed for J. WILKIE, No. 71, St. Paul's Church-Yard.

M.DCC.LXXV.

FIG. 4. Title page, *Nervous Sciatica*, London, 1775. First English edition.
Courtesy of the Surgeon General's Library.

DOMINICI COTUNNII

PHIL. ET MED. DOCT.

DE

ISCHIADE NERVOSA

COMMENTARIUS.

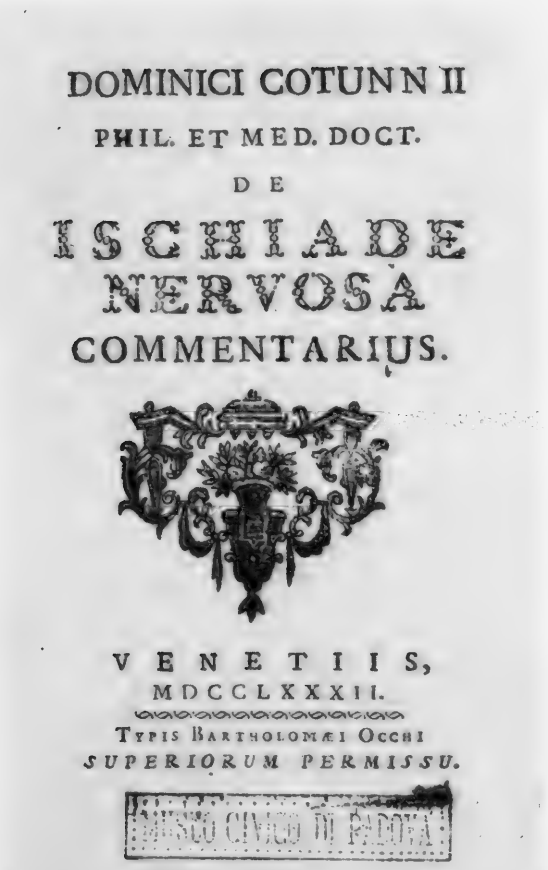
NEAPOLI, ET BONONIÆ

Ex Typographia Sancti Thomæ Aquinatis

MDCCLXXV.

SUPERIORUM AUCTORITATE.

Fig. 5. Title page, *De Ischiade Nervosa*, Naples and Bologna, 1775.


DOMINICI COTUNNII
PHIL. ET MED. DOCT.
DE
ISCHIADE
NERVOSA
COMMENTARIUS.

VENETIIS,
MDCCLXXXII.
TYPIS BARTHOLOMÆI OCCHI
SUPERIORUM PERMISSU.

MUSEO CIVICO DI PADOVA

FIG. 6. Title page, *De Ischiade Nervosa*, Venice, 1782.

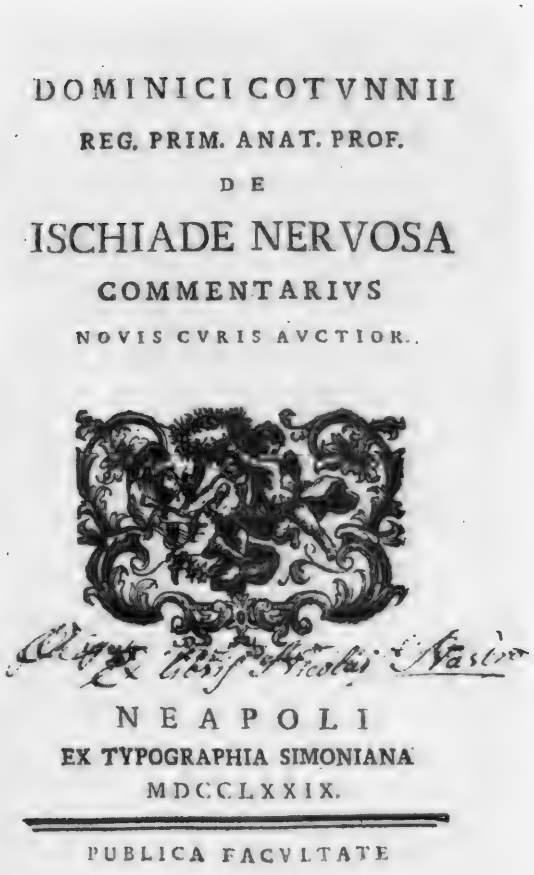

DOMINICI COTVNNII
REG. PRIM. ANAT. PROF.
DE
ISCHIADE NERVOSA
COMMENTARIVS
NOVIS CVRIS AVCTIOR.
NEAPOLI
EX TYPOGRAPHIA SIMONIANA
MDCCLXXIX.
PUBLICA FACVLTATE

FIG. 7. Title page, *De Ischiade Nervosa, Novis Curis Auctior*, Naples, 1779. First Latin edition.

DOMINICI COTVNNII
REG. PRIM. ANAT. PROF.
DE
ISCHIADE NERVOSA
COMMENTARIVS
NOVIS CVRIS AVCTIOR.

NEAPOLI, ET BONONIÆ
MDCCLXXXIX.

EX TYPOGRAPHIA SANCTI THOMÆ AQUINATIS
Superiorum Auctoritate.

FIG. 8. Title page, *De Ischiade Nervosa, Novis Curis Auctior*, Naples and Bologna, 1789.

DOMINICI COTVNNII

REGII ANAT. PROF.

DE

SEDIBVS VARIOLARVM

ΣΥΝΤΑΓΜΑ.

NEAPOLI

APVD FRATRES SIMONIOS

MDCCLXIX.

PVBLICA FACVLTATE.

FIG. 9. Title page, *De Sedibus Variolarum*, Naples, 1769. First Latin edition.

DOMINICI COTTVNNII
REGII ANAT. PROF.
DE
SEDIBVS VARIOLARVM
ΣΥΝΤΑΓΜΑ.
VIENNAE
APVD RVDOLPH. GRAEFFER. 1771.

FIG. 10. Title page, *De Sedibus Variolarum*, Vienna, 1771.

DOMINICI COTUNNII

REGII ANAT. PROF.

DE

SEDIBUS VARIOLARUM

ΣΥΝΤΑΓΜΑ.

NEAPOLI, ET BONONIÆ

MDCCLXXV.

Ex Typographia Sancti Thomæ Aquinatis.

Superiorum Auct. [illegible].

Fig. 11. Title page, *De Sedibus Variolarum*, Naples and Bologna, 1775.

DOMINICI COTTVNNII

REGII ANAT. PROF.

DE

SEDIBVS

VARIOLARVM

ΣΥΝΤΑΓΜΑ.

CUM INDICE. . .

LOVANII,

TYPIS ACADEMICIS.

MDCCLXXXVI.

FIG. 12. Title page, *De Sedibus Variolarum*, Louvain, 1786. Courtesy of the Surgeon General's Library.

DOMINICI COTVNNII
REG. PRIM. ANAT. PROF.
DE
SEDIBVS VARIOLARVM
ΣΥΝΤΑΓΜΑ.

NEAPOLI, ET BONONIÆ
MDCCLXXXIX.

EX TYPOGRAPHIA SANCTI THOMÆ AQUINATIS
Superiorum Auctoritate.

FIG. 13. Title page, *De Sedibus Variolarum*, Naples and Bologna, 1789.

DOMINICI COTUNNII

EQUITIS AC MEDICI PRAESTANTISSIMI

OPUSCULA MEDICA

ANTEHAC SEORSIM AB AUCTORE IN LUCEM EDITA,
NUNC PRIMUM IN DUO VOLUMINA COLLECTA.

Cum iconibus aere incisis.

VOL. I.

NEAPOLI,
Ex Officina Bibliographica et Typographica.
M. DCCC. XXVI.

FIG. 14. Title page, *Opuscula Medica*, vol. 1, Naples, 1826.

FIG. 15. Obverse, Cotugno medal, Naples, 1824.
Showing bust.
From the Storer Collection, Boston Medical Library.

FIG. 16. Reverse, Cotugno medal, Naples, 1824.

Hygeia stands in center with helmet and staff of Aesculapius. To the left, a kneeling winged figure presents her with medallion of Cotugno. To the right, a seated female figure points to a model showing the muscular system.

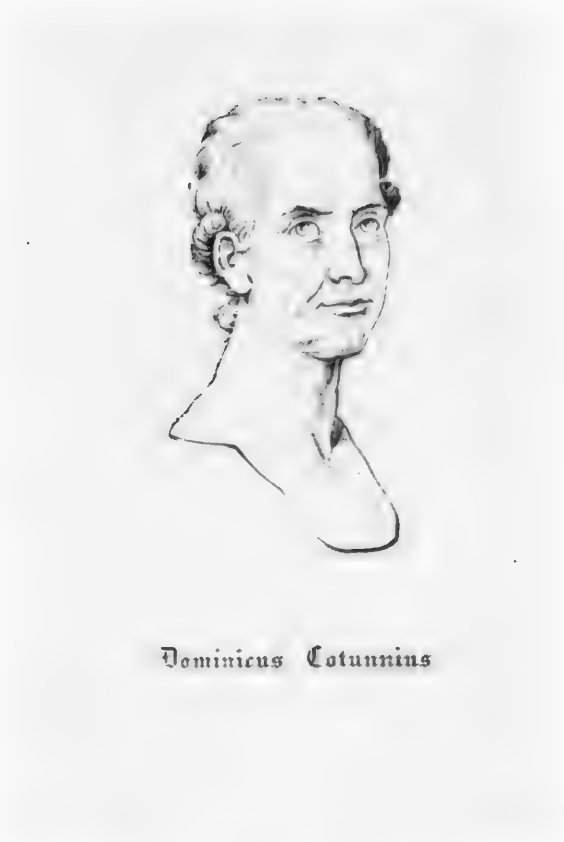


FIG. 17. Frontispiece, showing portrait from *Opuscula Medica*, vol. 1, Neapoli, 1826.

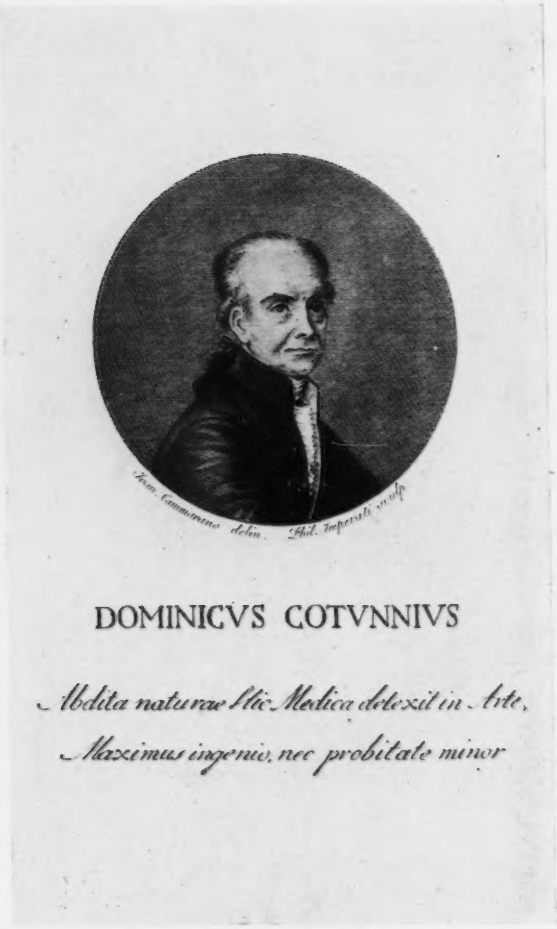


FIG. 18. Frontispiece, showing portrait, from *Elogio Storico del Cavalier D. Domenico Cotugno*, Napoli, 1823.